

North Slope Borough

OFFICE OF THE MAYOR

P.O. Box 69
Barrow, Alaska 99723
Phone: 907 852-2611 or 0200
Fax: 907 852-0337 or 2595

Edward S. Itta, Mayor

October 5, 2009



Mr. Mike Lidgard
U.S. EPA, Region 10
Office of Water and Watersheds, NPDES Permits Unit
1200 Sixth Avenue, Suite 900, M/S OWW-130
Seattle, Washington 98101

RE: Notices of Intent (NOI), NPDES General Permit AKG-28-0000
Shell Gulf of Mexico 2010 Outer Continental Shelf Lease Exploration Plan,
Chukchi Sea, Alaska, Drillship M/V *Frontier Discoverer*
Lease Number OCS-Y-2111, Lease Block 6864;
Lease Number OCS-Y-2142, Lease Block 7007;
Lease Number OCS-Y-2321, Lease Block 6912;
Lease Number OCS-Y-2267, Lease Block 6714;
Lease Number OCS-Y-2280, Lease Block 6764.

Dear Mr. Lidgard:

Thank you for the opportunity to comment on the Notices of Intent (NOI) for Shell Gulf of Mexico's (Shell's) proposed NPDES General Permit (GP) discharges associated with its proposed 2010 Chukchi Sea Exploration Plan.

Shell proposes to discharge between 1.9 and 2.9 million gallons of effluents, including toxic and bioaccumulating waste, each day into the Chukchi and Beaufort Seas over the course of a 120 day exploration season. Many of the species likely to be impacted by the proposed discharges are critical to our subsistence harvest. As you have learned from your extensive discussions with our people, we favor keeping Alaska North Slope marine habitats as free from pollution as possible. Although we are engaged in wage employment, we continue to depend heavily on subsistence harvests for food. Traditional foods are far more nutritious than many types of imported "store-bought" food.¹

¹ The subsistence diet protects against obesity and diabetes, and associated problems such as hypertension and cardiovascular disease. Restricted access to subsistence foods therefore places the community at increased risk for these problems. If the fundamental role of subsistence is displaced, very significant increases in obesity and diabetes in the impacted communities would predictably ensue. See

Subsistence activities also provide spiritual and cultural affirmation, and are crucial for passing skills, knowledge and values from one generation to the next, thus ensuring cultural continuity and vibrancy. The North Slope Borough (NSB) thus takes seriously the regulation of industrial discharges to the marine environment. We have established a number of policies to preserve the fragile environment on which most NSB residents depend for subsistence.² We hope that EPA reviews our comments with these policies in mind.

NSB prepared the attached comments after extensive internal review, consultation with the Minerals Management Service and coordination with you and your staff at EPA to assist you in determining whether the proposed discharge activities are suitable for coverage under the NPDES General Permit AKG-28-0000 and whether the Shell NOI are complete.

Our conclusion is that you should require that the proposed discharges be individually permitted pursuant the Clean Water Act's National Pollutant Discharge Elimination System (NPDES), 33 U.S.C. §§ 1311(a), 1342, and the factors articulated in 40 C.F.R. § 122.28(b)(3) for determining whether a project fits within the General Permit. The proposed effluent discharges are inaccurately characterized in the NOI to fit under the NPDES discharge categories listed in the General Permit. The very high volumes of effluent discharges associated with this proposed activity are under-reported and un-quantified in terms of toxic waste pollutant loads, and the discharges are not assessed for aggregate effects. Moreover, likely adverse effects to subsistence resources, including endangered bowhead whales, seals, walrus and fish—all directly impacted by the toxic and bioaccumulating wastes associated with the proposed discharges are not addressed in the NOI. Permitting the discharges individually would provide for the use of technologies and practices that can significantly control or abate the impacts of the significant volumes that Shell plans to discharge.

The NSB has multiple interests at stake in the Chukchi Sea Exploration Plan underlying

Ebbesson SO, Kennish J et al. Diabetes is Related to Fatty Acid Imbalance in Eskimos. *International Journal of Circumpolar Health*. 58: 108-119. 1999.

Shephard R and Rode A. The Health Consequences of Modernization: Evidence from Circumpolar Peoples. Cambridge University Press. 1996.

Curtis T, Kvernmo S et al. Changing Living Conditions, Lifestyle, and Health. *International Journal of Circumpolar Health*. 64(5) 442-450.

Jorgensen M, Bjerregaard P et al. Diabetes and impaired glucose tolerance among the Inuit of Greenland. *Diabetes Care*. 26: 1766-1771. 2002

Zinman, B. Diabetes in indigenous populations: genetic susceptibility and environmental change. Accessed at www.d4pro.com/idm/site/diabetes_in_indigenous_populations_.htm on 6/22/2006.

Ebbesson S, Schraer C et al. Diabetes and impaired glucose tolerance in three Alaskan Eskimo Populations. *Diabetes Care*. 21: 563-569. 1998

Indian Health Service. *Interim Report to Congress: Special Diabetes Program for Indians*. December 2004. Accessed online on August 9, 2006 at http://www.ihs.gov/MedicalPrograms/diabetes/resources/r_rtc2004index.asp.

Hogan P et al. Economic Costs of Diabetes in the U.S. in 2002. *Diabetes Care*. 2003. 26: 917-932.

² See, for example., NSBMC 19.70.50 (L) (NSB does not permit development that will likely result in significantly decreased productivity of subsistence resources or their ecosystems, or development on or near a shoreline that has the potential of adversely impacting water quality, unless there are no alternatives, and the developer has taken all feasible and prudent steps to avoid the adverse impacts); NSBMC 19.70.50 (R) (Development is required to minimize its negative impact and to maintain the natural permafrost insulation quality of existing soils and vegetation.)

these NOI. First and foremost are those related to the health and welfare of our residents, who are rightfully concerned about potential health impacts associated with wastes from oil and gas development on the North Slope.

With this in mind, we ask you to take the time necessary to assure that the contemplated discharges are individually permitted and that the best available technologies and practices be considered for controlling or abating these significant discharges to our marine environment. We also ask that you strive to meaningfully involve the local communities in the individual permitting process, particularly the Inupiat people who will be disproportionately impacted by proposed action as is required by Executive Order 12898, NSB subsistence resource policies and your own regulations.

If you have any questions regarding these comments, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Edward S. Itta". The signature is fluid and cursive, with a long horizontal stroke at the end.

Mayor Edward S. Itta

Appendices/Attachments

CC: Taqulik Hepa, NSB Director Department of Wildlife Management
Dan Forster, NSB Director Department of Planning & Community Services
Bessie O'Rourke, NSB Attorney
Karla Kolash, NSB Mayor's Office
Andy Mack, NSB Mayor's Office
Hanh Shaw, EPA, Region 10
Ted Rockwell, EPA, Region 10
Jeffrey Walker, Minerals Management Service

NORTH SLOPE BOROUGH'S COMMENTS ON
SHELL'S NOTICES OF INTENT

I. SHELL'S PROPOSED DISCHARGES ARE UNSUITABLE FOR COVERAGE UNDER THE GENERAL PERMIT.

Congress enacted the Clean Water Act (CWA) to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” 33 U.S.C. § 1251(a). The Act prohibits the discharge of pollutants from a point source without a permit issued under the terms of the National Pollution Discharge Elimination System (NPDES), 33 U.S.C. §§ 1311(a), 1342. General NPDES Permits are procedurally and substantively similar to individual permits, but when suitable, may apply to large numbers of sources discharging into many different bodies of water.³

Both individual and general permits are intended to include substantive restrictions on the discharge of pollutants in order to meet the goals of the CWA.⁴ The effluent limitations contained in most permits specify the quantity or concentrations of specific pollutants that may be discharged from point sources. When a discharge is outside of the scope contemplated in a general permit, or when new technologies or practices exist which undercut the general permit’s application, the discharge should be individually permitted to assure that the permittee meets water quality standards, complies with other federal laws, applies the best available technology to control or abate the contemplated discharge, and affords the affected public an opportunity to be involved in the process. EPA provides a regulatory mechanism for individual permitting in a general permit context found at 40 CFR § 122.28(b)(3)(i).

The factors identified at 40 CFR § 122.28(b)(3)(i) make clear that the discharges contemplated by Shell’s 2010 Chukchi Exploration are unsuitable for coverage under the general permit. Changes have occurred in the availability of demonstrated technologies and practices for control or abatement of pollutants contemplated by the action. 40 CFR § 122.28(b)(3)(i)(B). Additionally, the discharges contemplated by Shell are a significant contributor of pollutants. 40 CFR § 122.28(b)(3)(i)(G).

A. There are demonstrated technologies or practices now available for control or abatement of the pollutants related to Shell’s Exploration activities.

As demonstrated in the attached material, the proposed Outer Continental Shelf (OCS) exploration can be accomplished using one of several viable options for waste handling: (1) annular injection of waste streams into the exploration well while drilling, (2) temporary storage of wastes and subsequent disposal into the exploration well prior to abandonment, (3) transportation of waste to the nearest onshore treatment facility or (4) a combination of these

³ EPA defines a “general permit” as an NPDES ‘permit’ issued under 40 CFR §122.28 authorizing a category of discharges under the CWA within a geographical area.” 40 CFR § 122.2 (2006).

⁴ In addition, NPDES permits typically contain monitoring and reporting requirements and a variety of other standard conditions. 40 CFR § 122.41.

four alternatives.⁵ As discussed below, these options would significantly control or abate the pollutants related to Shell's exploration activities and should be considered within an individual permit process.

As indicated in the attached materials, injection has been achieved during offshore exploration drilling operations on a mobile offshore drilling unit (MODU) through a subsea wellhead. An individual permitting process would consider whether this technology is appropriate for Shell's discharges, and whether there are site-specific reasons for not utilizing this technology. The individual permitting process would also consider whether transportation of waste to an onshore treatment facility is a viable option. While Shell does not currently own offshore or onshore-based waste disposal facilities on the North Slope, its intent for long-term operation in Alaska on a number of projects makes this an investment opportunity. Current operators have established fee-based agreements for use of existing facilities, and this can be a temporary option for Shell, until it invests in its own facility.

B. Shell's significant proposed discharge is outside the scope of the NPDES discharge categories of the general permit.

An individual permit is appropriate when the discharge is a significant contributor of pollutants. 40 CFR § 122.28(b)(3)(i)(G). In making this determination, the EPA should consider the following factors: (1) the location of the discharge with respect to waters of the United States; (2) the size of the discharge; (3) the quantity and nature of the pollutants discharged to waters of the United States; and (4) other relevant factors. *Id.*

1) The discharges are proposed to occur in the Chukchi Sea, which is home to an abundance of marine species, yet there is a conceded lack of baseline data regarding its water quality and environmental sensitivity.

The discharges contemplated in the NOI will be deposited in the Chukchi Sea, one of the most biologically rich, yet scientifically uncharacterized waters of the United States.

The Chukchi Sea, a portion of the Arctic Ocean north of the Bering Strait and west of the Beaufort Sea, provides habitat and rich feeding grounds for a great variety of marine life and irreplaceable subsistence resources upon which Inupiat communities along its coast have depended for thousands of years. Sensitive populations of bowhead whales, humpback whales, fin whales, polar bears, and spectacled and Steller's eiders, all protected by the Endangered Species Act, 16 U.S.C. § 1531, *et seq.* (ESA), inhabit the sea. Every spring, nearly the entire Western Arctic stock of bowhead whales, including mothers and calves, migrates north and east through the Chukchi Sea on their way to summer feeding grounds, and every autumn they return south and west through the sea en route toward southern wintering grounds. The lead system,

⁵ See Attachment 1: Harvey, Susan, *Review of Shell Exploration and Production Company's August 2008 Analysis of the Pros and Cons of Zero Discharge of Muds and Cuttings During Exploration Drilling in the Alaska Beaufort Sea Outer Continental Shelf, and Shell's May 2009 Supplemental Information on Annular Injection and Barents Sea Exploration Permits*, June 16, 2009, written as a response to Shell Oil Analysis of the Pros and Cons of Zero Discharge of Muds and Cuttings During Exploration Drilling In the Alaskan Beaufort Sea Outer Continental Shelf, August 2008 (also included).

polynyas, ice edge and coastal areas of the sea also provide vital feeding and denning habitat for polar bears. Pacific walrus, particularly females, calves, and sub-adults, use the Chukchi Sea as primary feeding grounds in summer and autumn. Ringed, spotted, ribbon and bearded seals, beluga whales, killer whales, minke whales, gray whales, and harbor porpoises, as well as many species of fish, including Pacific salmon and Arctic cod, and over 40 species of marine and coastal birds, also inhabit the Chukchi Sea.⁶

The Chukchi Sea is the center of the culture, identity, and subsistence way of life for Inupiat Eskimo communities along its coast. The sea provides these communities with food, clothing, and materials for traditional arts. For example, a large majority of the households of Point Hope obtain half or more of their food from harvesting local subsistence resources. The nutritional benefits of subsistence foods to the Inupiat cannot easily be replaced by store-bought foods. Barrow, Point Hope, and Wainwright engage in subsistence hunting of bowhead whales each spring and, in the case of Barrow, fall. These communities and others, such as Point Lay and Atkasuk, engage in extensive food sharing and bartering, which is an integral part of traditional Inupiat family organization. Thus, all across the North Slope, in communities that engage directly in whaling as well as in communities that do not, the bowhead is of unique spiritual importance—a focal point of sharing, cooperation and the preservation of cultural traditions. Aside from the bowhead, Chukchi Sea communities engage in subsistence hunting of walrus, seals, beluga whales, polar bears, birds, and fish, all of which depend upon the health of the Chukchi Sea ecosystem. The importance of these subsistence activities can hardly be overstated – they are at the core of Inupiat identity.⁷

a. Absence of Water Quality Baseline

Despite the cultural and biological significance of the Chukchi Sea, there is a profound lack of basic scientific knowledge about the sea and the wildlife that inhabits it. This lack of knowledge has been identified by the EPA on multiple occasions, most recently in comments to the Minerals Management Service on the proposed Beaufort and Chukchi Sea Oil and Gas Lease Sales 209, 212, 217 and 221 Draft Environmental Impact Statement:

Currently, there are large data gaps and limited analyses of air and water quality in the DEIS. It also appears that data necessary for EPA permitting under the Clean Air Act and Clean Water Act are not currently available, and may not be available at the point when permit applications are submitted. EPA is also concerned about the extent and range of uncertainties that result from these gaps, and the lack of adequate support for many of the conclusions in the document, including impact analysis conclusions and conclusions based on some TEK [traditional environmental knowledge] information. **EPA recommends that baseline environmental data be collected throughout the lease sale process and prior to exploration activities,**

⁶ All the described environment of the Chukchi Sea is found at: MMS AR 975-977 Minerals Management Service, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea, Final Environmental Impact Statement OCS EIS/EA MMS 2007-026, (May 2007).

⁷ *Id.*

and that new information be utilized by MMS in its management strategies and subsequent NEPA analyses.⁸ (Emphasis added)

The lack of baseline data about the sea is compounded by the rapid changes to the ecosystem caused by global climate change. The Chukchi Sea is one of the “principle bellwethers to climate change in North America and the Arctic Ocean.”⁹ During recent decades, the Arctic has warmed more quickly than any other region on earth.¹⁰ Perennial sea-ice cover is disappearing at a rate of about 9 percent per decade.¹¹ Summer sea-ice has retreated an average of 13.1 additional days each decade.¹² Winter sea-ice extent was at a record low in 2005 and 2006.¹³ Summer sea-ice extent retreated to record lows in 2002, 2005, and again in 2007, and extreme minima were observed in 2003, 2004, and 2006.¹⁴ These changes appear to be accelerating.

Climate change in the Chukchi Sea has the potential to adversely affect the subsistence practices and human health of Inupiat communities across the North Slope. The subsistence way of life depends on healthy wildlife populations in the Chukchi Sea. Diminished health of Chukchi wildlife, such as ice-dependent walrus, threatens communities’ ability to rely on these species for subsistence. Sea-ice change may threaten subsistence livelihoods, by altering migration patterns and the distribution of important subsistence species, including bowhead whales and walrus, and increasing the dangers inherent in hunting on the sea-ice.¹⁵

b. Environmental Sensitivity

On April 17, 2009, the D.C. Court of Appeals determined in *Center for Biological Diversity v. Dep’t of Interior*, 563 F.3d 466 (D.C. Ct App, 2009) that the Department of Interior violated the Outer Continental Shelf Lands Shelf Act (OCSLA) in approving a 2007-2012 OCS Leasing Plan that did not conduct an environmental sensitivity analysis under Section 18(a)(2)(G) of OCSLA. Pending completion of this sensitivity analysis, the validity of all actions carried out in Alaska pursuant to 2007-2012 plan—including the lease under which Shell proposes to discharge into the Chukchi Sea—are in question.

⁸ See April, 2009 Letter from Christine Reichgott (EPA Region 10) to John Goll prepared in accordance with EPA’s responsibilities under the National Environmental Policy Act (NEPA) and Clean Air Act Section 309 regarding the MultiSale DEIS for Lease Sales 209, 212, 217 and 221.

⁹ See MMS AR 975-977 Minerals Management Service, Chukchi Sea Planning Area, Oil and Gas Lease Sale 193 and Seismic Surveying Activities in the Chukchi Sea, Final Environmental Impact Statement OCS EIS/EA MMS 2007-026, p. 42 (May 2007)(hereinafter cited as Lease Sale 193 FEIS).

¹⁰ See Memorandum from Steve Lewis, U.S. Fish and Wildlife Service, to Henri Bisson, Bureau of Land Management, Re: Endangered Species Act, Section 7 Biological Opinion for the proposed Amendment to the Northeast National Petroleum Reserve-Alaska Integrated Activity Plan / Environmental Impact Statement, pp. 7-8 (January 13, 2005).

¹¹ See Andrew E. Derocher, *et al.*, *Polar Bears in a Warming Climate*, INTEGR. COMP. BIOL., 44:163-176 (2004).

¹² See, Center for Biological Diversity, Petition to List the Polar Bear (*Ursus maritimus*) as a Threatened Species Under the Endangered Species Act, p. 5 (February 16, 2005).

¹³ Lease Sale 193 FEIS, p. 35.

¹⁴ *Id.*

¹⁵ *Id.* at pp. 236-242.

As demonstrated above, despite the vital importance of the Chukchi Sea to the Inupiat people, there are large data gaps regarding water quality and overall environmental sensitivity of the area to discharge.

2) The discharge will far exceed any amounts contemplated in the General Permit, and will include toxic and bio-accumulating waste.

The NOI propose significant pollutant discharge volumes that are entirely unanticipated and unevaluated in the NPDES General Permit, Arctic Ocean Discharge Criteria Evaluation (ODCE) or justified by existing Oil & Gas exploration operations in the Chukchi and Beaufort Seas.¹⁶

a. The NOI Are Mischaracterized to Fit Under the NPDES Discharge Categories Listed in the General Permit.

Table 1 below evaluates discharges for the five (5) proposed exploration wells in the Chukchi Sea for which the discharger has requested discharge approval under the General Permit. Additionally, the two (2) proposed exploration wells in the Beaufort Sea are listed in Table 1 because it is significant that these wells are also planned for the same period, from July through October 2010.

The proposed NOI effluent discharges are inaccurately characterized to fit under the NPDES discharge categories listed in the General Permit.¹⁷ The effluent discharges are un-quantified in terms of toxic waste pollutant loads, and the discharges lack assessment concerning aggregate effects of the waste composition being released. Moreover, because the NOI fail to address toxicity and bioaccumulation impacts on the prey species for whales, seals and fish, all subsistence resources are directly affected.

Figure 1 and Table 2, also below, show the project well discharge rates based on the NOI. Table 2 specifically shows project discharge rates for 10 of the 11 proposed Chukchi Sea discharges from the Burger F well. The Burger F is representative of the other four wells because all the discharge rates from the other exploration wells are similar. The proposed Discharge Number 012 - Excess Cement Slurry was not included in the figure because it is listed as a smaller one-time discharge volume.

b. The Contemplated Thermal Discharge Volume Alone Triggers Need for Individual Permit.

The biocide-treated thermal discharge contemplated by the proposed action is 9 to 13.5 times the amount considered in the General Permit. This increase in volume from that contemplated in the General Permit has presumably resulted from altered thermal controls for engines and machinery cooling system design control standards.¹⁸ This proposed discharge also invokes 40 CFR

¹⁶ See Page B-6 of the ODCE: Table 2-6. Quantities and Discharges in Arctic Alaska (1997-2003).

¹⁷ See Table 4, at the end of this report, for a list of waste discharges proposed for discharge under the NPDES General Permit.

¹⁸ Christen Knak, 1990, *Diesel Motor Ship's Engines and Machinery* states on page 393 that "The amount of salt water cooling is adjusted so that it is heated only to approximately 10 °C to 15 °C."

122.28(b)(3)(i)(E), such that the contemplated volumes of discharge are no longer appropriately controlled by the General Permit.

i) **Requirements of Clean Water Act Sections 316(a) and (b)**

The large magnitude seawater intake for the non-contact cooling water, of between 1.9 to 2.9 million gallons per day (mgd), requires a specific Arctic Ocean site and facility evaluation. This is consistent with the objectives of an NPDES individual permit, which identifies limits on discharges that are a significant contributor of pollutants. Specifically, this is pursuant to the CWA 316(a) requirement:

Effluent limitations that will assure protection and propagation of balanced, indigenous population of shellfish, fish, and wildlife

With respect to any point source otherwise subject to the provisions of section 1311 of this title or section 1316 of this title, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the projection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made, **the Administrator (or, if appropriate, the State) may impose an effluent limitation under such sections for such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water.**¹⁹ (Emphasis added)

Section 316(b) also supports the necessity of an Arctic Ocean site and facility evaluation:

Cooling water intake structures

Any standard established pursuant to section 1311 of this title or section 1316 of this title and applicable to a point source shall **require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.** (Emphasis added).

c. Significant Divergence of Proposed NOI from General Permit.

Table 3 below evaluates the six (6) primary issues relating to proposed NOI divergence from the conditions evaluated in the ODCE and GP. These differences render the proposed NOI as inaccurate characterizations unsuitable for coverage under the general permit. The actual discharge being proposed is extensively more polluting, of higher volume and ultimately more

¹⁹ Clean Water Act §1326(a).

environmentally destructive than the NOI acknowledge. The NOI thus considerably exceed the adverse conditions anticipated in the GP and the ODCE.

3. The quantity and nature of the waste proposed for discharge into the Chukchi Sea are potentially harmful to endangered species such as the bowhead whale and to the public health.²⁰

As indicated above, the quantities of discharge associated with Shell's 2010 Chukchi Exploration Plan are outside the scope of the general permit. The nature of the waste contained within the discharge is also outside the scope. The toxic effects of metals and their environmental and food chain transport have been the subjects of recent studies in arctic regions. Thus it has been established that anthropogenic contributions of heavy metal contaminants to air, water, soil and food impact the fauna of the Arctic and the consumers of these animals. Most metals can affect multiple organ systems, but frequently each metal has a critical effect seen in a specific organ or tissue.

Trace metals, including toxic metals, occur naturally in the environment and many are essential for life. However, some toxic metals have increased in the biosphere significantly over time. The dose of metal exposure is the amount of metal in an organ manifesting a toxicologic effect. This is a function of time as well as exposure to a metal. A single measurement of a metal in a tissue may be indicative of a recent exposure or of a more chronic, long-term exposure, depending upon the tissue and its particular retention time for that element. This, in turn, is influenced by the biological half-life of the metal. This is important when designing studies dealing with elements in marine mammals. Small sample numbers and single time testing regimes may not provide an accurate representation of the metal in the particular tissue/organism of interest. A well-designed study will cover a variety of organs, tissue types and tissue depths from a variety of age groups over different times of the year and, optimally, will include animals in different reproductive stages. Samples should be gathered from different geographic regions, as well. Antagonistic and synergistic influences of metals on the accumulation and effects of each other must also be taken into account. These are just a few of the many factors that must be considered when making comparisons of toxin levels in marine mammals.

²⁰ Prepared by Cheryl Rosa, D.V.M., Ph.D., *Environmental Impact of Industrial Pollutants*, NSB Department of Wildlife Management.

Dr. Cheryl Rosa is a Wildlife Veterinarian and Research Biologist for the NSB Department of Wildlife Management. She has reviewed Shell's disposal plans and has identified a number of concerns related to disposal of industrial pollutants (such as muds and cuttings) in subsistence use areas because they contain heavy metals and other substances which bioaccumulate in subsistence foods which are ultimately eaten by the NSB residents.

Dr. Rosa's doctoral thesis focused on the impacts of industrial toxins on subsistence resources in the Arctic; she specifically studied toxicity impacts and bioaccumulation of toxins such as mercury and cadmium (among other toxins) in the bowhead whale. She has personally examined the health of hundreds of bowhead whales and has provided data from additional peer-reviewed publications on other cetaceans (mysticetes and odontocetes), pinnipeds (seals and walrus) and an ursid (polar bear) that represent the marine mammals of the Arctic. It is these experiences she draws from when summarizing concerns of the local community.

In general, metal concentrations are low in seawater; however, if heavy metals are introduced into the Chukchi Sea, they will become more "bioavailable" to the invertebrates at the base of the Arctic Ocean food web in comparison with warmer ocean areas, because of the amount of organic material that can bind with them and cause them to settle at greater depths. Shell has not provided any toxicology data or analysis to show their proposed discharges will not be toxic to subsistence resources or humans. Shell would need to show that the toxins are either not biologically available to subsistence resources, and that these toxins do not bioaccumulate to a level that is harmful to the subsistence resource itself and the humans who consume it.

Phytoplankton and zooplankton are well known to bioaccumulate metals and are the principal prey for baleen whales, some pinniped species, and fish, which, in turn are prey for toothed whales and most pinnipeds. Cadmium accumulates more effectively in the bowhead whale and other baleen whales, whereas mercury tends to increase in beluga.

As the drilling muds are discharged they will be distributed through the water column and suspended for a time, until they finally reach the seabed floor. The marine mammals feeding in this area at the time of discharge will ingest drilling muds that are available in the water column at the time they are moving through. Since drilling muds are typically disposed of in batches, a whale feeding near the drilling ship could be exposed to these drilling muds while feeding or migrating.

Shell has not provided any data to show how much industrial pollution will bioaccumulate in the subsistence resources, nor has Shell provided information on the effects these metals may have on the health of marine species that are consumed by subsistence users.

A brief summary of Dr. Rosa's work on the Bering-Chukchi-Beaufort stock of bowhead whales is provided below. Published information on other Arctic species has also been provided. Dr. Rosa's research and the literature review below show that both cadmium and mercury pollution are present in variable amounts in animals used for subsistence foods. Shell has not provided any scientific evidence or human toxicological data to support the safety of increasing the amount of toxins in the subsistence food sources by introducing additional heavy metals into the Chukchi Sea. It would not be sound scientific practice to introduce such a high volume of discharge, particularly harmful toxins, into the marine environment without understanding the site-specific impact on endangered species, subsistence foods, marine animals and humans.

a. Specific Biological Impacts

i. Cetaceans.

Cetaceans radiate from several distinct evolutionary lines. It stands to reason that these different groups bioaccumulate metals in different ways and exhibit different effects from toxic exposures. In the Arctic, the primary odontocete species studied include the beluga whale (*Delphinapterus leucas*) and the narwhal (*Monodon monoceros*). These whales occupy the top of the food chain, being mainly piscivorous. The mysticete species whose range is primarily in the Arctic is the bowhead whale (*Balaena mysticetus*). These whales consume prey on a low trophic level, feeding on the zooplankton, which constitute the base of the arctic food web. Bratton et al.

(1997) and O'Shea and Brownell (1994) found that comparison of available data revealed that, in general, mysticete whales have lower concentrations of metals residues in their tissues than odontocetes, with the exception of cadmium. Other factors which may apply to both groups are evident, such as large body size, unusually low mass-specific metabolic rates, physiological and biochemical adaptations for deep diving, large storage compartments (blood, lipid), and wide amplitudes of seasonal cycles in fat storage and mobilization (O'Hara and O'Shea 1999).

ii. Pinnipeds.

The marine mammals that make up the pinniped groups in the Alaskan Arctic (the ice seals) include the bearded seal, the spotted seal, the ribbon seal, the bearded seal (*Erignathus barbatus*), the ringed seal (*Phoca hispida*) and the walrus (*Odobenus rosmarus*). Major factors influencing heavy metal contaminant load in these seals include individual species' diet and the region that the species inhabits. Animals feeding in benthic zones (bearded seals) and on the bottom (walrus) are likely to have a greater exposure to metals-containing sediment as compared to seals that feed higher in the water column. Prey choice will have effects as well, for example, species that feed heavily on squid, which are known to contain high levels of cadmium, will most likely have higher levels of cadmium in their livers and kidneys. Prey choice may also exhibit regional and seasonal variability. In addition, many of these seals are apex predators, feeding on a variety of prey species that have the potential to bioaccumulate toxins and thus biomagnify these toxins up the food chain to the seals.

iii. Polar Bears.

Several researchers have investigated trace minerals and metals in polar bears in the Arctic and Greenland, secondary to petroleum and mining development in these regions. Polar bears are apex predators, with diets consisting mainly of seals (predominantly ringed and bearded seals). It has been shown that ringed seals are the predominant food source in the eastern Arctic (bearded seals <3%) and that bearded seals make up a greater percentage of the polar bear diet (13-24%) in the western Arctic. This is significant as the bearded seal has more benthic feeding habits that may affect the types and amounts of accumulated toxins. Bearded seals are thought to accumulate Hg 15 times faster than ringed seals in certain regions of the Arctic. Walruses (bottom feeders) may also be more available as carrion to polar bears in the western Arctic. The possible effect of Hg on bears is of concern, especially in northern Alaskan regions where Hg levels are high, though Lentfer *et al.* captured over 600 polar bears from the region in 1980 and saw no obvious signs of mercury intoxication (Lentfer, 1976). Polar bears serve as a bio-indicator species for arctic development in some regions (i.e. indicators of environmental mercury burden), although overlap of sub-populations and lack of baseline data have made interpretation of these data difficult.

iv. Contaminant Exposure.

The NSB's review of the projected waste streams associated with the 2010 exploration drilling underlying the proposed NOI is attached for your review.²¹

Additionally, the NSB has identified potential acute biological effects associated with the discharges as reported in available literature:

- 1) Altered benthic communities dominated by short-lived, opportunistic polychaetes.
- 2) Decreased abundance of typical species (i.e., barnacles) within the mixing zone.
- 3) Species mortality in discharge zone (e.g. oysters).

Potential chronic effects reported in the literature:

- 1) Impacts on the surface microlayer surrounding exploration/production platforms;
- 2) Altered benthic community species composition (plant and animal);
- 3) Altered behavior and physiology, reduced growth and decreased fecundity of exposed laboratory species;
- 4) Induced or inhibited enzyme systems and other molecular effects;
- 5) Reduced immunity to disease and parasites;
- 6) Histopathological lesions and other cellular effects;
- 7) The potential for tainted flesh in subsistence foods (ie., fishes);
- 8) Chronic mortality.²²

All of these effects are proposed to take place where human food migrates and is ultimately harvested.

b. Health Impacts.

²¹ See Attachment 3, NSB comments on Shell's 2010 Camden Bay Exploration Plan, included herewith by reference. While the exploration activity reviewed in that proposal is in the Beaufort Sea, the NOIs and discharges are identical.

²² Bratton GR, Flory W, Spainhour CB, Haubold EM. Assessment of selected heavy metals in liver, kidney, muscle, blubber, and visceral fat of Eskimo harvested bowhead whales from Alaska's north coast, Final Report (North Slope Borough, Department of Wildlife Management) Barrow, Alaska. 1997; 233 pp.

O'Hara T, O'Shea, TJ. (1999) *In*: Reynolds, J.E. and Rommel, S.A editors. *Biology of Marine Mammals*. Smithsonian Books, Washington, D.C. 2002. 578 pp.

O'Shea TJ, Brownell RL. Organochlorine and metal contaminants in baleen whales: a review and evaluation of conservation implications. *Sci Tot Environ* 1994; 154: 179-200.

A detailed health impact analysis is not available for this specific proposed action.²³ The NSB however has reviewed international best practices for managing OCS discharges, and found that community concern over potential contamination, coupled with acknowledged data gaps (such as the lack of baseline data regarding current levels of contaminants produced by local oil and gas operations in subsistence species (U.S. DOI BLM 2007), and the absence of any quantitative nutritional data delineating the amount of subsistence foods consumed), creates uncertainty in such assessments. Whalers are meticulous while on the ice during spring whaling in their efforts to prevent even miniscule amounts of contaminants from contacting whales (Lohman 2007, personal communication). Fears about contamination are well-documented causes for decreased participation in subsistence activities and decreased consumption of subsistence foods (Ballew et al., 2004; Poppel et al. 2007). In this case, the recognized data gaps regarding the subsistence consumption contaminant exposure pathway could contribute to these fears and exacerbate the problem. Decreased consumption of subsistence foods would constitute an adverse effect on the nutrition and physical activity of NSB residents. Similarly, decreased consumption of subsistence foods could create an incremental increased risk of problems such as diabetes, obesity, and hypercholesterolemia. As described above, any adverse impact on subsistence would increase stress in communities, which constitutes an adverse effect on public health.

An individual permit would allow for a fuller consideration of Executive Order 12898, disproportionate impacts, as well as CEQ regulations relating to health impact assessment.

3. Other relevant factors - significant difference in the nature of the effluents and the discharges contemplated by the general permit and the threat of disproportionate impact to the Inupiat Native Population of the North Slope.

The following are additional relevant considerations that demonstrate the need for an individual permit under the CWA.

a. Ocean Discharge Criteria for Toxic and Bioaccumulating Chemicals.

Allowance of the proposed five NOI discharges into the Chukchi Sea will result in unreasonable degradation of the environment in violation of CWA 403 - Ocean Discharge Criteria. Specifically, there would be a violation of 40 CFR 125.122 because information of quantities, composition and potential for bioaccumulation or persistence of the pollutants to be discharged has been ignored and omitted in the NOI; and a violation of 40 CFR 125.123, particularly (b) and (c), because EPA cannot issue an authorization to discharge under the NPDES program without knowledge of the magnitude and impact of significant toxic and bioaccumulating discharges.

Drilling fluids, muds and cuttings proposed for discharge under the NOI, and containing large amounts of suspended solids incorporating toxic and bioaccumulating metals and hydrocarbons, are eventually deposited on the seafloor. If approved under the GP, the failure of the NOI to accurately compare compositions and properties to environmental impact criteria, including the EPA sediment criteria used in the GP, will result in ocean dumping violations of 40 CFR 227.5 for prohibited materials.

²³ But see Attachment 2, part 3, and Dr. Aaron Wernham's Declaration regarding O & G related health impacts.

Moreover, 40 CFR 227.27 limits the permissible concentration, thus restricting ocean dumping of materials. Particularly, federal regulation ties the permissible limits to bioassays conducted with EPA-approved measures, which include whole effluent testing methods described in the subsection *Required Reports Relied Upon By Discharger are Omitted in NOI*. Accordingly, 40 CFR 227.27 requires:

§ 227.27 Limiting permissible concentration (LPC).

(a) The limiting permissible concentration of the liquid phase of a material is:

(1) That concentration of a constituent which, after allowance for initial mixing as provided in §227.29, does not exceed applicable marine water quality criteria; or, when there are no applicable marine water quality criteria,

(2) That concentration of waste or dredged material in the receiving water which, after allowance for initial mixing, as specified in §227.29, will not exceed a toxicity threshold defined as 0.01 of a concentration shown to be acutely toxic to appropriate sensitive marine organisms in a bioassay carried out in accordance with approved EPA procedures.

(3) When there is reasonable scientific evidence on a specific waste material to justify the use of an application factor other than 0.01 as specified in paragraph (a)(2) of this section, such alternative application factor shall be used in calculating the LPC.

(b) The limiting permissible concentration of the suspended particulate and solid phases of a material means that concentration which will not cause unreasonable acute or chronic toxicity or other sublethal adverse effects based on bioassay results using appropriate sensitive marine organisms in the case of the suspended particulate phase, or appropriate sensitive benthic marine organisms in the case of the solid phase; and which will not cause accumulation of toxic materials in the human food chain. Suspended particulate phase bioaccumulation testing is not required. These bioassays are to be conducted in accordance with procedures approved by EPA, or, in the case of dredged material, approved by EPA and the Corps of Engineers.

(c) Appropriate sensitive marine organisms means at least one species each representative of phytoplankton or zooplankton, crustacean or mollusk, and fish species chosen from among the most sensitive species documented in the scientific literature or accepted by EPA as being reliable test organisms to determine the anticipated impact of the wastes on the ecosystem at the disposal site. Bioassays, except on phytoplankton or zooplankton, shall be run for a minimum of 96 hours under temperature, salinity, and dissolved oxygen conditions representing the extremes of environmental stress at the disposal site. Bioassays on phytoplankton or zooplankton may be run for shorter periods of time as appropriate for the organisms tested at the discretion of EPA, or EPA and the Corps of Engineers, as the case may be.

(d) Appropriate sensitive benthic marine organisms means two or more species that together represent filter-feeding, deposit-feeding, and burrowing characteristics. These organisms shall be chosen from among the species that are most sensitive for each type they represent, and that are documented in the scientific literature and accepted by EPA as being reliable test organisms to determine the anticipated impact on the site.

b. Applicability of NEPA to the Proposed Discharges

As proposed in the NOI, the discharges do not meet the requirements of the General Permit and must be considered new sources under 40 CFR 6.101. That is: Part 6—Procedures for Implementing the National Environmental Policy Act and Assessing the Environmental Effects

Abroad of EPA Actions. Specifically Subpart A—General Provisions for EPA Actions Subject to NEPA states:

§ 6.101 Applicability.

(a) Subparts A through C of this part apply to the proposed actions of EPA that are subject to NEPA. EPA actions subject to NEPA include the award of wastewater treatment construction grants under Title II of the Clean Water Act, **EPA's issuance of new source National Pollutant Discharge Elimination System (NPDES) permits under section 402 of the Clean Water Act**, certain research and development projects, development and issuance of regulations, EPA actions involving renovations or new construction of facilities, and certain grants awarded for projects authorized by Congress through the Agency's annual Appropriations Act. [Bold added]

According, NEPA assessment is required, at 40 CFR 6.205, where a proposed action is expected to result in environmental impacts:

§ 6.205 Environmental assessments.

(a) The Responsible Official must prepare an environmental assessment (EA) (see 40 CFR 1508.9) for a proposed action that is expected to result in environmental impacts and the significance of the impacts is not known. An EA is not required if the proposed action is categorically excluded, or if the Responsible Official has decided to prepare an EIS. (See 40 CFR 1501.3.)

(b) Types of actions that normally require the preparation of an EA include:

Including

(2) EPA's issuance of new source NPDES permits under section 402 of the Clean Water Act;

c. Endangered Species Act Section 7 Consultation

The ODCE recognizes the threatened and endangered species in the areas of discharge including the bowhead whale, and spectacled and Steller's eiders.²⁴ Adverse impacts from discharges potentially resulting in a decline in abundance and/or change in distribution must be addressed under the Endangered Species Act. (ESA) The proposed discharge directly affects large numbers of prey species such as copepods, krill, juvenile fish and other organisms that whales, seals, fish, crustaceans and other animals rely on.

Section 7(a)(2) of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq) requires federal agencies, in consultation with and with the assistance of the Secretaries of Commerce and Interior, to insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of endangered or threatened species or destroy or adversely modify designated critical habitat. The principles, practices, and protocols for section 7 consultations are identified in the ESA, and regulations promulgated in 1986 for implementing section 7 (50 CFR. Part 402), further expound the procedural and substantive requirements for consultation.

d. Site-Specific EPA Temperature Criteria

²⁴ ODCE, Page 4-2, last bulleted item.

Consistent with the necessity of an individual permit, the EPA *Criteria for Water* (1986) support performing an arctic site-specific evaluation of the thermal discharge stating for:

Marine Aquatic Life

In order to assure protection of the characteristic indigenous marine community of a water body segment from adverse thermal effects:

- a. The maximum acceptable increase in the weekly average temperature resulting from artificial sources is 1.0 C (1.8 F) during all seasons of the year, providing the summer maxima are not exceeded; and
- b. Daily temperature cycles characteristic of the water body segment should not be altered in either amplitude or frequency.

Summer thermal maxima, which define the upper thermal limits for the communities of the discharge area, should be established on a site-specific basis.²⁵

The temperature increase associated with the thermal discharge in this action is higher (at least 1.8 C), than that contemplated in the foregoing criteria. Site-specific analysis is thus appropriate.

e. Environmental Justice

On February 11, 1994, President Clinton issued Executive Order 12898 on environmental justice. That Order focused federal agency attention on environmental and human health impacts to communities of color and low-income communities, and required federal agencies to incorporate achieving environmental justice into their missions. Thus, EPA must consider environmental justice when issuing and administering NPDES permits.

The National Environmental Justice Advisory Council ("NEJAC") is a federal advisory committee to EPA that specifically provides advice on environmental justice issues. As a result of its December 2001 meeting, NEJAC issued the report, "Fish Consumption and Environmental Justice." That report states:

[C]ommunities of color, low-income communities, tribes, and other indigenous peoples *depend* on healthy aquatic ecosystems and the fish, aquatic plants, and wildlife that these ecosystems support. While there are important differences among these various affected groups, their members generally depend on the fish, aquatic plants, and wildlife to a greater extent and in different ways than does the general populations. These resources are consumed and used to meet nutritional and economic needs. For some groups, they are also consumed or used for cultural, traditional, or religious purposes. For members of these groups, the conventional understanding of the 'health benefits' or 'economic benefits' of catching, harvesting, preparing, and eating fish, aquatic plants, and wildlife do not adequately capture the significant value these practices have in their lives and the life of their culture.

²⁵ EPA, 1986, *Criteria for Water*, Page 275 under the Section "Temperature".

“Fish Consumption and Environmental Justice” (as revised in November 2002), p. iv-v (emphasis in original). NEJAC also stated, “The [federal] trust responsibility requires the federal government and its agencies to uphold the highest fiduciary standards when its actions affect the well-being of Alaska Native villages, their property (including subsistence rights), resources, and culture.” *Id.* At 132.

The Inupiat people rely on the Chukchi Sea for subsistence foods, which support their traditional way of life. As a result, EPA has a heightened duty to ensure that the proposed discharge protects the habitat and water quality that sustains their subsistence practices.

II. THE INACCURATE AND INCOMPLETE CONTENTS OF THE NOI DO NOT COMPLY WITH THE REQUIREMENTS OF 40 C.F.R. § 122.28(b)(2)(ii) AND THE GENERAL PERMIT.

40 C.F.R. § 122.28(b)(2)(ii) requires that “[t]he contents of the notice of intent shall be specified in the general permit and shall require the submission of information necessary for adequate program implementation, including at a minimum, the legal name and address of the owner or operator, the facility name and address, type of facility or discharges, and the receiving stream(s).

As demonstrated below and more specifically in Appendix A, the NOI fail to provide the information required by 40 C.F.R. § 122.28(b)(2)(ii) and the GP. A number of fundamental problems exist regarding the accuracy and completeness of the NOI. These include impossible exploration timing assumptions that undercut the accuracy of waste flow rates for the drillship. An evaluation of all five (5) NOI wells was carried out in detail for accuracy, omissions and completeness.

Appendix B, also attached, contains an example of omitted line drawing(s) of the waste streams and absent waste source amounts. Appendix B is based on the discharger submitted NOI for the Burger F exploratory well and serves as a direct example of the significant problems associated with the NOI submittals for all five (5) wells.

A. The Reported Duration and Discharge Rates of Exploration Drilling in the NOIs is Impossible in Light of the Actual Time Available for 2010 Exploration Activities.

Exploration duration and availability of the drillship Frontier Discoverer is a major schedule contradiction. This is because the proposed duration of exploration of about 185 days exceeds the actual period during which the drillship is available, which is only about 120 days. This schedule conflict is evaluated in Table 1, which shows that rather than spending 37 days at each well site, the drillship will only spend 24 days at each site. Only 24 days are actually available. This follows from the calculation that only 65% of the proposed time is actually available.²⁶

This time conflict results in significant misrepresentation of the materials proposed for discharge relative to GP requirements because the discharge rates for each of the proposed discharge types is significantly increased when the data provided are adjusted to actual times the drillship will be

²⁶ Available 120 days divided by proposed 185 days equals the fraction 0.65, i.e., 65%.

available at each drill-site. This is compared to the discharge rates reported in the NOI table for each of the five exploration wells. To put it another way, in order to discharge the total volumes reported in the NOI table in the actual amount of time at each drillsite, the discharge rate MUST increase. It means that all the proposed discharge rates are at least 150% of what has been reported in the NOI table for each of the 5 wells. Moreover, the discharge volumes contain large amounts of toxic and bioaccumulating chemicals. So as discharge rate intensity increases, the pollutant load intensity increases.

B. Errors in Discharge Type Water Depths

All five of the NOI for the Chukchi Sea have numerous errors in discharge water depth for the various discharge types. These errors consistently exaggerate dilution in the 100-meter mixing zone²⁷ identified in the Ocean Discharge Criteria²⁸ surrounding the drillship Frontier Discoverer and minimize the apparent biological impact of the various discharges.

C. Required Facility Information and Waste Load Quantities Omitted in NOI.

The five NOI for the proposed discharges into the Chukchi Sea are required by the General Permit to provide line drawings, and to construct waste flow balances, containing facility information:²⁹

The line drawing must show flows of discharged waste streams through the facility. Indicate intake sources, operations contributing to the effluent, and treatment units labeled to correspond to the discharges (001 - 014). Construct a flow balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a flow balance cannot be determined, provide a pictorial description of the nature and amount of any sources, and any collection or treatment measures.

The NOI contain no line drawings showing waste streams through the facility, which indicate intake sources, operations contributing to the effluent and treatment units. Moreover, no flow balance has been provided on any line drawings showing flows between intakes, operations, treatment units and outfalls. Nor was an accurate description provided of the nature and amount of any sources, nor any collection or treatment measures, with the exception of total discharge volumes in the NOI table. The table provided in each of the NOI included only waste discharge volumes but absolutely no toxic and other waste amounts to be discharged.

D. Required Reports Relied Upon By Discharger are Omitted in NOI.

None of the five (5) NOI for the proposed discharges into the Chukchi Sea provides the necessary reports for special monitoring, biological surveys, and environmental reports as required in the NOI.³⁰ These are reports the discharger substantially relied upon in assembling

²⁷ Baumgartner, *et al.*, 1994, *Dilution Models for Effluent Discharges*, Third Edition.

²⁸ See 40 CFR 125.121(c)).

²⁹ General Permit AKG280000, Attachment 1 – Notice of Intent Information Sheet, Page A1-3, under “Special Conditions”.

³⁰ *Id.*

the NOI. Missing reports substantially relied upon by the discharger include, but are not limited to;

- 1) Effluent characterization of drilling muds, fluids and cuttings and ODC model results of mixing zone deposition of suspended solids from the #001 and #013 discharges including pollutant amounts of toxic metals, hydrocarbons and biocides related to sediment criteria supporting the GP and the ODCE.
- 2) Thermal discharge analysis for NPDES Discharge Number 009 – Non-Contact Cooling Water including the OOC model of the effluent mixing zone and the effluent characterization used to determine the discharge temperature and biocide load. The effect of the thermal discharge on biological indicators is subject to the EPA temperature Criteria for Water³¹ but is analyzed nowhere in the NOI reporting.
- 3) Thermal intake structure analysis and reporting required by the CWA 316(b) to ensure environmental and biological impact is minimized.
- 4) Whole effluent toxicity (WET) testing and evaluation required by the TSD cited in the General Permit. EPA guidance documents include *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms* (2002); and *Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms* (2002).

³¹ EPA, 1986, *Criteria for Water*, Page 275, see under “Temperature” heading.

Table 1. Seven (7) NOI for Discharges to the Beaufort and Chukchi Seas
Proposed Non-Contact Cooling Water Discharges by the Drillship *Frontier Discoverer* for Shell Exploration & Production Company
Starting July 4, 2010 (Chukchi) and July 10, 2010 (Beaufort) through October 31, 2010.

Well Name & No.	Reported Estimated Duration (days)	Reported Total Discharge Amount (bbl/well)	Reported Total Discharge Amount in gallons/well	Reported Average Discharge Rate (bbl/day)	Reported Average Discharge Rate (gallons/day)	Reported Average Discharge Rate in gallons/min	Effective Duration ^{a,c} Based on Number of Days Available (days)	Effective Discharge Rate (gallons/day)	Effective Discharge Rate (gallons/min)
Chukchi Sea Receiving Waters									
Burger F	37	1,665,000	69,930,000	45,000	1,890,000	1,312.5	24	2,913,750	2,023.4
Burger C	37	1,665,000	69,930,000	45,000	1,890,000	1,312.5	24	2,913,750	2,023.4
Burger J	37	1,665,000	69,930,000	45,000	1,890,000	1,312.5	24	2,913,750	2,023.4
Cracker/Jack C	37	1,665,000	69,930,000	45,000	1,890,000	1,312.5	24	2,913,750	2,023.4
SW Shoebill C	37	1,665,000	69,930,000	45,000	1,890,000	1,312.5	24	2,913,750	2,023.4
<i>Chukchi Subtotals</i>	185		349,650,000				120		
Adjusted Chukchi Subtotals⁴	111		209,790,000				72		
Beaufort Sea Receiving Waters									
Sivulliq N	34	1,530,000	64,260,000	45,000	1,890,000	1,312.5	22	2,913,750	2,023.4
Torpedo H	40	1,800,000	75,600,000	45,000	1,890,000	1,312.5	26	2,913,750	2,023.4
Total Number of Days Reported=	185	Total Vol.=	349,650,000	gallons	Total Number of Days Available= 120				

^A Based on only 3 of 5 wells being explored in the summer/fall of 2010.

These adjusted subtotals are used in the calculations for Reported Total Number of Days & Volume Intake/Discharge.

^B Calculate the Duration Error Factor (actual number of proposed days divided by available days) = (185/120) =

^C Divide the Reported Estimated Duration days by the Error Factor to get the Effective Duration in days.
one barrel (bbl) = 42 gallons

1.54 = 154%

Actual Number of Days Available

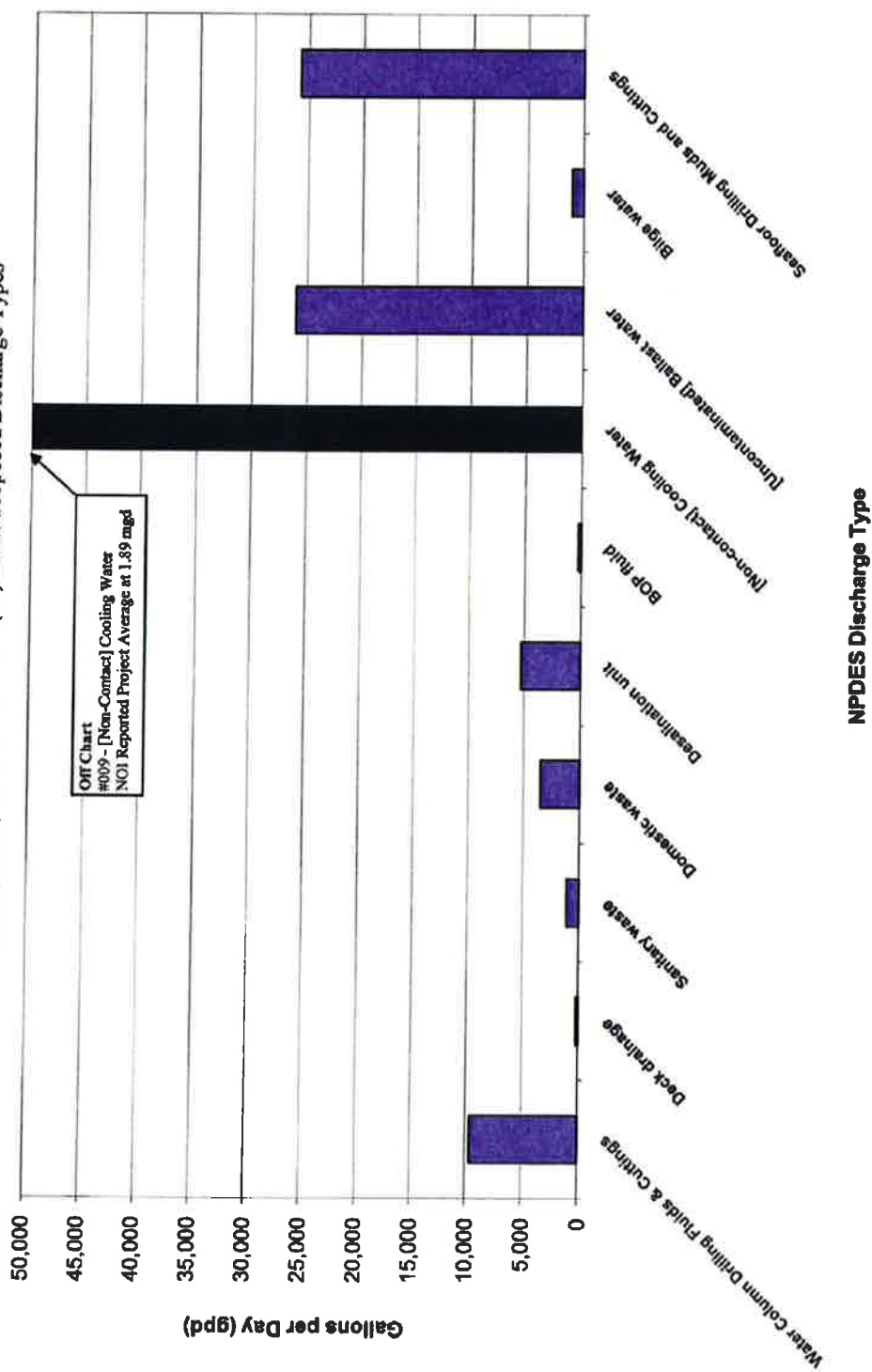
July	28	
August	31	Not subtracting for the number of days required for the whale hunts.
September	30	Not subtracting for the number of days required for the whale hunts.
October	31	
Total Number of Days Available=	120	

Tab1_NOI Chukchi&Beauf_Duration

Page 1 of 1

10/3/2009

**Figure 1. Chukchi Sea: Burger F Well - NOI Reported Average Project Discharge Volumes
During O&G Exploration (Close-up Scale)
On Gallons-per-Day Unit Basis for Ten (10) of the Proposed Discharge Types**



□ Table 2. Chukchi Sea: Burger F Well - NPDES Notice of Intent (NOI) to Discharge
Reported Project Total and Average Discharge Volumes for Proposed O&G Exploration
On Gallons-Per-Day Unit Basis for Ten (10) of the Proposed Discharge Types

For Chukchi Sea: Burger F Well		Reported Total and Average Discharge Volumes in gallons ^B			
NPDES #	Type of Waste ^A	in bbl		in gallons ^B	
		Total	Average	Total	Average
#001	Water Column Drilling Fluids & Cuttings	7310	229	307,020	9,618
#002	Deck drainage	185	5	7,770	210
#003	Sanitary waste	1000	27	42,000	1,134
#004	Domestic waste	3071	83	128,982	3,486
#005	Desalination unit	4625	125	194,250	5,250
#006	BOP fluid	42	7	1,764	294
#009	[Non-contaminated] Cooling Water	1,665,000	45,000	69,930,000	1,890,000
#010	[Uncontaminated] Ballast water	22940	620	963,480	26,040
#011	Ballast water	1000	25	42,000	1,050
#013	Seafloor Drilling Muds and Cuttings	3070	614	128,940	25,788
Overall Project Total and Average		71,746,206		1,962,870	

^ASorted by NPDES Discharge Type and Number

^B1 barrel (bbl) = 42 gallons

Tab2_Quantities to Chukchi Sea

Table 3. Proposed NOI – Significant Divergence from General Permit AKG280000

ID	Divergence from GP Issue	Description	NPDES Discharge Number Affected
1	Reported Total Project Duration is Physically Impossible.	At least 185 days of operation are proposed in the Chukchi and Beaufort Seas NOI for the drillship Frontier Discoverer. However, only a maximum of 120 days are available in the year 2010 exploration period.	All project average flow rates are affected with an error of at least 150% of NOI reported discharge rates. These rates are directly calculated from the erroneous NOI project durations for each well. This adversely affects the reported discharge rates for #001, #003, #004, #005, #009, #010, #011, and #013. Adverse effects result because more pollutants are being released in a shorter period of time than reported in the NOI.
2	Proposed Discharges of Drilling Muds, Fluids and Cuttings ignore EPA Sediment Criteria for toxic materials. ¹	The discharger ignored EPA sediment criteria used in the GP and ODC, and relating to discharge of suspended solids waste concentrations of muds and cuttings. The discharger omitted or relied exclusively on sediment criteria not considered in the GP.	Waste discharges from the drilling muds, fluids and cuttings discharge categories #001 and #013 exceed toxic and bioaccumulating pollutant loads considered by EPA in the GP and ODC. These toxic and bioaccumulating chemicals include metals, hydrocarbons and potentially chlorinated organics. See Trefry and Trocine (2009), <i>Chemical Assessment in Camden Bay (Stivliq Prospect and Hammerhead Drill Site), Beaufort Sea, Alaska</i> .
3	Seawater thermal intake and discharge is excessive ignoring NOAA Fisheries criteria for minimizing intake flow velocities, and other mitigation measures, related to the mortality and survival of Arctic aquatic organisms. Moreover, the discharger ignores EPA water quality criteria for temperature, toxics and bioaccumulating chemicals.	At a magnitude of 2.9 mgd, the Average Daily Flow (ADF) rate is 13.5 times the rate anticipated in the GP and ODC for non-contact cooling water. At 1.9 mgd, which is the discharge rate reported in the NOI for [non-contact] cooling water, the proposed thermal discharge is 9 times ² the rate anticipated in the general permit.	#009 – [Non-contact] Cooling Water All other seawater intakes competing for seawater are adversely affected by the excessive operation of the large magnitude thermal intake. These include at least: #001 - Drilling Fluids and Drilling Cuttings; #005 - Desalination Unit Wastes; #010 - [Uncontaminated] Ballast Water; and #013 - Mud, Cuttings, Cement at Seafloor. Reported thermal structure intake velocities exceed recommended conservation measures for fish criteria. ³ The criteria limit intake velocities, among other design considerations, to 0.5 feet per second. However, the discharger reported a value of 0.7 fps without supporting analysis of the fish intake structure. ⁴ Additionally, the flow rate and reported velocity are actually higher being at least 150% of reported values, i.e., the actual velocity is at least 1.0 fps, exceeding the recommended criteria by a factor of two. Thermal discharge is subject to EPA temperature Criteria

Table 3 Continues on Next Page.

¹ EPA, 1985, sediment criteria used in GP is from *Assessment of Environmental Fate and Effects of Discharges from Oil and Gas Operations* (EPA 440/4-85/002), 1985.

² Arctic Ocean Discharge Criteria Evaluation (ODCE, 2006), Page 2-15, 2nd par., 2nd sentence under section 2.4.4. Non-Contact Cooling Water of the Arctic ODC for the NPDES permit AKG280000 only anticipated flows up to 0.21 mgd but 1.89 mgd is proposed in the NOI. This results from 1.89 divided by 0.21, i.e., greater flow rate by 1.89/0.21=9 times.

³ Page 93, Number 2 under Recommended Conservation Measures, NOAA Fisheries, 2009, *Management Plan for Fish Resources of the Arctic Management Area*, North Pacific Fishery Management Council Fisheries.

⁴ See drillship Frontier Discoverer discussion on Page 27 of the main report for the Camden Bay Exploration Plan (CBEP), 1st paragraph under the section "Projected Cooling Water Intake".

Table 3. (Continued) Proposed NOI – Significant Divergence from General Permit AKG2800000

4	Biocides addition of toxic and bioaccumulating chemicals and subsequent discharges exceed conditions anticipated by EPA in the GP and ODCE.	Average daily pollutant load from biocide treatment, for a 2.9 mgd magnitude cooling water (thermal) flow, is 13.5 times the addition anticipated in the GP and ODCE.	Also, for the NOI reported 1.9 mgd discharge rate for the [non-contact] cooling water (NPDES Discharge Number #009), the biocide pollutant load is 9 times the addition anticipated in the general permit. All other discharges receiving biocide treatment are adversely affected by the excessive operation of the large magnitude thermal intake biocide addition. These include at least: #001 - Drilling Fluids and Drilling Cuttings; #010 - [Uncontaminated] Ballast Water; and #013 - Mud, Cuttings, Cement at Seafloor.
5	The NOI do not adhere to the EPA TSD guidance ⁶ used in the GP for toxic chemical, and other adverse, effects resulting from discharges into the Chukchi Sea	TSD guidance used in developing the GP is ignored in the NOI. ⁷ There is no NOI information for water quality criteria, reasonable potential analysis, waste load allocation or effluent limitation beyond those evaluated in the ODCE and GP.	All discharge types affected. Particularly: the excessive magnitude of the thermal discharge (#009); expansion of pollutant load of the biocide addition (#001, #009, #010 and #013); and the unanticipated increases in toxic sediment pollutant loads and discharges (#0012 and #013) are well beyond conditions considered in the ODCE and GP.
6	Lack of adherence of the NOI to EPA guidance for whole effluent toxicity (WET). ⁸ The NOI and GP ignore the aggregate effect of the numerous toxic, and adverse, discharges emanating from the drillship <i>Frontier Discoverer</i> .	The TSD identified WET as an effluent characterization requirement for assessing the impact of discharges into receiving waters like the Chukchi Sea. The aggregate effect of the 11 proposed discharges was not considered in the NOI	The following toxic discharges act together adversely affecting conditions in the Chukchi Sea: #001, #003, #004, #005, #009, #010, #011, and #013. The following toxic discharges act together adversely affecting conditions in the Chukchi Sea: #001, #003, #004, #005, #009, #010, #011, and #013.

⁵ Arctic Ocean Discharge Criteria Evaluation (ODCE, 2006), Page 2-15, 2nd par., 2nd sentence under section 2.4.4. Non-Contact Cooling Water of the Arctic ODCE for the NPDES permit AKG2800000 only anticipated flows up to 0.21 mgd but 1.89 mgd is proposed in the NOI. This results from 1.89 divided by 0.21, i.e., greater flow by 1.89/0.21=9 times.

⁶ EPA TSD, 1991, *Technical Support Document for Water Quality-based Toxics Control*. See General Permit Fact Sheet page 12, II.C.1, under Subsection - Water Quality-based Evaluation, 2nd paragraph.

⁷ The NPDES General Permit Fact Sheet (AKG2800000) states: "In determining whether water quality-based limits are needed and developing those limits when necessary, EPA follows guidance in the *Technical Support Document for Water Quality-based Toxics Control* (TSD; EPA, 1991). The water quality-based analysis consists of four steps: (1) determine the appropriate water quality criteria that apply to each discharge, (2) determine if there is 'reasonable potential' for the discharge to exceed the criteria in the receiving water, (3) develop a WLA if there is reasonable potential, and (4) develop effluent limitations based on the WLA."

⁸ EPA TSD, Page 4, Section 1.3 Whole Effluent Approach for Aquatic Life Protection states: "The whole effluent approach to toxics control for the protection of aquatic life involves the use of acute and chronic toxicity tests to measure the toxicity of wastewaters. Whole effluent toxicity is a useful parameter for assessing and protecting against impacts upon water quality and designated uses caused by the aggregate toxic effect of the discharge of pollutants [16]. Whole effluent toxicity tests employ the use of standardized, surrogate freshwater or marine (depending upon the mixture of effluent and receiving water) plants, invertebrates, and vertebrates. EPA has published extensive written protocols listing numerous marine and freshwater species for toxicity testing [17, 18, 19]."

List of NOI Proposed Discharge Types

Table 4 lists all the NPDES Discharge Number and Types proposed for release of waste flows into the Chukchi Sea.

Table 4. Proposed Waste Discharges and Types for General Permit (AKG280000)

NPDES Discharge Number	Type of Waste
#001	Water Column Drilling Fluids & Cuttings
#002	Deck drainage
#003	Sanitary waste
#004	Domestic waste
#005	Desalination unit
#006	BOP fluid
#009	[Non-contact] Cooling Water
#010	[Uncontaminated] Ballast water
#011	Bilge water
#012	Excess Cement Slurry
#013	Seafloor Drilling Muds and Cuttings